hoary bats, and no impacts to threatened or endangered bat species are anticipated. The level of this impact on hoary and silver-haired bat populations is hard to predict, as there is very little information available regarding the overall population size and distribution of the bats potentially affected. Other regional monitoring studies suggest resident bats do not appear to be significantly affected by wind turbines and almost all mortality is observed during the fall migration period. Also, hoary bat and silver-haired bats, which are expected to be the most common fatalities, are widely distributed in North America.

For the larger region (the 2,600-square mile area described previously), total bat mortality could range from 3,130 to 8,000 bats annually if all of the proposed wind projects are constructed. Overall populations of bats in the region are not well documented, thus conclusions about population effects from turbine mortality would be speculative.

4.7 Vegetation

4.7.1 Impact Levels

Impacts would be considered **high** where actions would:

- Create an unavoidable adverse effect on a federally-listed threatened or endangered plant species;
- Significantly reduce the quantity or quality of a regionally or nationally important botanical reserve, plant population, or similar botanical habitat area;
- Spread noxious weeds due to construction or maintenance; or
- Adversely affect rare or declining species at the regional level.

Impacts would be considered **moderate** where actions would:

- Create an effect on threatened or endangered plant species that could be partially mitigated;
- Temporarily disturb sensitive plants during construction but would not affect the viability of local populations;
- Cause a local reduction in the quantity or quality of vegetation communities (as opposed to regional reductions); or
- Marginally reduce the productivity of adjacent vegetation communities or resources (such as wetland plant communities or botanical reserves).

Impacts would be considered **low** where actions would:

- Create an effect that could be largely mitigated;
- Reduce the quantity or quality of vegetation communities confined to the site of the action;

- Cause no major effect on productivity of adjacent vegetation communities;
- Temporarily disturb common plant species;
- Reduce plant communities that are very common in the project vicinity;
- Adversely affect relatively common species at a local level (i.e., occurring within the immediate vicinity of the project and not affecting regional populations); or
- Cause temporary effects or those that could be minimized by site planning or by placing seasonal restrictions on construction activities.

No impacts would occur when an action would create no impacts or fewer impacts than the low impact level.

4.7.2 BPA Proposed Action

4.7.2.1 Impacts

The Proposed Action would affect only agricultural areas in the long term. Towers and substation facilities would remove about 16.6 acres of agricultural plant communities, which are very common in the region (see Table 4-5). Therefore, impacts would be low. Undeveloped habitats (i.e., not in agricultural use) would be spanned by structures or avoided, so no long-term impacts to those vegetative communities would occur.

During construction, temporary access to tower construction sites would be gained by crossing existing agricultural lands, which would be re-planted with agricultural crops or cover crops to restrict the spread of weeds. The total amount of temporary disturbance would be about 116 acres. Short-term impacts would be low.

4.7.2.2 Mitigation Measures

The following mitigation actions would apply to all project activities and are anticipated to benefit all habitat vegetation/categories and wildlife species:

- Maps would be prepared to show sensitive areas that are off limits during the construction phase. These areas would be flagged in the field prior to construction and the construction contractors would be directed to avoid them during construction. Sensitive areas may include vegetation types that provide nesting or denning areas for special status/sensitive wildlife.
- Road construction and vehicle use would be minimized where possible to minimize impacts to sensitive habitats. For instance, if construction occurs during summer, access to tower locations would not have to be graveled.
- For habitat restoration and revegetation, seed mixes would be developed in consultation with ODFW. Restoration efforts would be discussed with the landowner to take into consideration existing land use activities and their potential impacts to the vegetation restoration efforts.

- A weed survey would be completed prior to and following construction. Measures to reduce the potential spread of noxious weeds would be developed in consultation with the Sherman County Soil and Water Conservation District. The facility would be monitored regularly to prevent the spread of noxious weeds.
- BMPs and erosion and sediment control measures would be employed during project construction to avoid and/or minimize impacts to downslope areas. Areas of unavoidable soil disturbance would be bounded downslope with straw wattles and bio-filter bags.

Table 4-5 Vegetation Impacts

Type of Land Disturbed	BPA Proposed Action	BPA Middle Alternative	BPA No Action Alternative	Klondike III Wind Project	Biglow Canyon Wind Farm
Temporary Impacts					
Grassland	0	0	0	3.2	1.0
Shrub-Steppe	0	0	0	0.0	1.5
CRP	0	0	0	38.8	16.5
Agricultural	116.19	119.95	0	250	363.5
Total	**116.19**	**119.95**	**0**	**292**	**382.5**
Permanent Impacts					
Grassland	0	0	0	.01	0.88
Shrub-Steppe	0	0	0	0.0	0.25
CRP	0	0	0	6.8	10.12
Agricultural	16.56	16.63	0	62	156.7
Total	**16.56**	**16.63**	**0**	**68.9**	**167.95**

4.7.3 Middle Alternative

4.7.3.1 Impacts

Impacts of the Middle Alternative would be similar to those of the Proposed Action. Towers and substation facilities would eliminate about 16.6 acres of agricultural plant communities. The total amount of temporary disturbance would be about 120 acres. Impacts to vegetation would be low.

4.7.3.2 Mitigation Measures

The same mitigation measures listed for the Proposed Action would be implemented for the Middle Alternative.

4.7.4 Klondike III Wind Project

4.7.4.1 Impacts

The Klondike III Wind Project facilities would permanently impact about 0.01 acre of grassland habitat, no shrub-steppe habitat, 6.8 acres of CRP habitat, and 62 acres of agricultural habitat. Because the impacts would be confined to the site of the action and the agricultural impacts would reduce common plant communities, the impacts would be low.

Construction activities would temporarily impact about 3.2 acres of grassland, 2.0 acres of shrub-steppe, 38.8 acres of CRP, and 250 acres of agricultural lands. There would also be about 0.03 acre of upland tree habitat temporarily impacted, although no trees would be removed or altered. The impacts would be confined to the site of the action, are temporary, and would only reduce common plant communities; therefore, the impact level would be low.

During the site visits conducted for the Klondike III Wind Project, no habitat for special status/sensitive plant species was found, and none is believed to be within the project corridor based on degraded site conditions.

4.7.4.2 Mitigation Measures

To mitigate for long-term effects to grassland habitat, PPM Energy would enhance other grassland habitats in the analysis area. In addition to the enhancement, a conservation easement, deed restriction, or other similar protective measure would be undertaken for the area in order to protect this area as wildlife habitat.

Temporary, construction-related impacts would be mitigated by:

- Requiring project facilities to be the minimum size needed for operations.
- Replacing agricultural topsoil to original condition.
- Using BMPs to prevent loss of topsoil during construction.
- Performing repair activities during operations.
- Controlling noxious weeds in areas disturbed by construction activities.

4.7.5 Biglow Canyon Wind Farm

4.7.5.1 Impacts

The Biglow Canyon Wind Farm facilities would permanently impact about 0.88 acres of grassland habitat, 0.25 acre of shrub-steppe habitat, 10.1 acres of CRP habitat, and 156.7 acres of agricultural habitat. Because the impacts would be confined to the site of the action and the agricultural impacts would reduce common plant communities, the impacts would be low.

Construction activities would temporarily impact about 1.0 acre of grassland, 1.5 acres of shrub-steppe, 16.5 acres of CRP, and 363.5 acres of agricultural areas. The impacts would be confined to the site of the action, are temporary, and would reduce common plant communities; therefore, the impact level would be low.

4.7.5.2 Mitigation Measures

PGE would enhance or create at least 11 acres of shrub-steppe habitat to mitigate for long-term impacts to undeveloped vegetative communities. A number of areas near and in the John Day River Canyon have been identified as potential areas for mitigation. These potential areas are located away from turbine corridors. A detailed mitigation plan would be finalized with willing landowners, with the concurrence of ODFW regarding mitigation area size, location, and vegetative goals. Both ODFW and the Sherman County Soil and Water Conservation District would be consulted regarding procedures for weed control and vegetation establishment and management.

Temporary impacts from construction activities would be mitigated by:

- Noxious weed control in construction areas, as described previously.
- Use of BMPs to minimize topsoil loss, and compliance with an erosion and sedimentation control plan approved by DEQ as part of the NPDES program in areas adjacent to drainage features.
- Consulting with Sherman County Soil and Water Conservation District for proper procedures for restoring agricultural quality to its original condition.

Because noxious weeds can have detrimental effects on native plant populations, the following additional measures would be implemented to control the introduction and spread of undesirable plants during and after construction:

- Areas disturbed during construction would be revegetated expeditiously.
- A noxious weed control plan would be developed following guidelines based upon consultation with the Sherman County Soil and Water Conservation District.
- The noxious weed control plan would be finalized prior to construction and would be implemented over the life of the Biglow Canyon Wind Farm facility.

4.7.6 No Action Alternative

No new impacts to vegetative resources would occur under the No Action Alternative. Current levels of disturbance would continue under this alternative. These levels include any impacts currently associated with maintenance activities for the existing BPA transmission lines and substations. These impacts could include noxious weed transport due to vehicular traffic, transmission structure maintenance, current vegetation management practices, and other such activities. However, any potential ongoing impacts from maintenance of existing BPA transmission lines and substations

would occur within a previously disturbed environment, which would result in no new impacts to undisturbed resources.

4.7.7 Cumulative Impacts

Native plant communities are being lost in the region because of past and current development and actions, and these trends will likely result in the further reduction of native plant communities. Cumulative projects in the region including the wind projects listed in Table 4-1 have impacted or could impact agricultural land and native habitats.

Most vegetative communities in the analysis area have been previously disturbed by human activities. The actions associated with the proposed projects would contribute incrementally and in a relatively minor way to the continuing cumulative loss of native vegetation communities. However, it is expected that long-term impacts of BPA's Proposed Action and the wind projects to undeveloped habitats would be mitigated and not contribute to cumulative impacts.

4.8 Visual Resources

4.8.1 Impact Levels

Impacts would be considered **high** where actions would:

- Become the dominant feature or focal point of the view, especially from residences or schools; or
- Become the dominant feature or focal point of the view and adversely affect the existing character and quality of views from parks, recreation facilities, public trails, and public lands and waters used for dispersed recreation where the appreciation of natural and scenic resources is a valued part of the use, such as the CRGNSA; or
- Affect a large number of sensitive viewers in predominantly the ***foreground*** and middle ground of the view; or
- Become the dominant feature or focal point of view from major travel corridors along which existing scenic quality is high and/or policies have been applied to preserve and enhance aesthetic values.

Impacts would be considered **moderate** where actions would:

- Be clearly visible in the view but not the dominant feature of the view; or
- Affect a large number of sensitive viewers mostly in the middleground of their view; or
- Not become the dominant view but are in view from parks, recreation facilities, public trails, and public lands and waters used for dispersed recreation where the appreciation of natural and scenic resources is a valued part of the use; or

- Not become the dominant view but would be in view from major travel corridors along which existing scenic quality is high and/or policies have been applied to preserve and enhance aesthetic values; or
- Not become the dominant view but would be in view from locally important roads along which visual quality is not high and which have not been designated for scenic protection.

Impacts would be considered **low** where actions would:

- Be somewhat visible but not obtrusive in the view; or
- Be seen by few sensitive viewers because facilities are screened, or predominantly viewed in the middleground and background of the view.

No impact would occur if:

- The facilities would be isolated, screened, not noticed in the view, or seen from a distance greater than three miles; or
- No visually sensitive resources would be affected.

4.8.2 Summary of Impacts from the Proposed Project

Table 4-6 summarizes potential impacts to visual resources within the analysis area. More information is also in Appendix B.

Table 4-6 Summary of Impacts to Visual Resources within the Analysis Area

Visual Resource	Level of Impact		
	BPA Action Alts.	**Klondike III**	**Biglow Canyon**
General Project Vicinity	Moderate	Moderate to High	Moderate to High
Columbia River Gorge National Scenic Area	Low to None	Low to None	Low to None
John Day River Canyon	None	Low to Moderate	Low to Moderate
Oregon National Historic Trail High Potential Sites:			
Fourmile Canyon	None	None	None
John Day River Crossing (a.k.a. McDonald Ferry)	None	Low to Moderate	None
Biggs Junction	None	None	None
Deschutes River Crossing	None	None	None
The Dalles Complex	None	None	None
Lower Deschutes River Canyon	None	None	Low to None
Lower Klickitat River Canyon	None	None	None
Journey Through Time Scenic Byway	Low	Low to Moderate	Low to Moderate

4.8.3 BPA Proposed Action

4.8.3.1 Impacts

Residential Areas

The Proposed Action would be visible from residences in the analysis area at distances ranging from the near foreground (less than 1,000 feet) to the distant background (greater than 20 miles) (see Maps 8 and 9). However, the local project vicinity includes few residences or other sensitive viewers, lacks KVAs, and lacks important visual resources with the exception of the John Day River Canyon.

The Proposed Action would result in moderate impacts because the transmission lines, towers, and substation facilities generally would be clearly visible in the view but would not be the dominant feature of the view.

Recreation Areas

Columbia River Gorge National Scenic Area

Portions of the Proposed Action would potentially be visible from the CRGNSA, although opportunities for viewing would be very limited. The proposed facility would be subordinate to the landscape setting that typically includes substantial human development such as interstate and rail transportation corridors, transmission lines, and urban and rural development in the foreground, middle ground, and background. Attenuating climatic conditions such as distance, haze, humidity, weather, or background landscape would further reduce visibility.

Impacts to the CRGNSA would be low to none because the proposed facility would be somewhat visible, but not obtrusive; would be seen by few sensitive viewers in the background; and would be seen from a distance of greater than 3 miles.

John Day River Canyon

The BLM administers the majority of public lands within the John Day River Canyon and has indicated that its concern would be visual impacts seen from the John Day River (Mottl, H., 2005a). The Proposed Action may be visible from higher portions of the John Day River Canyon (i.e., near the canyon rim), but it would not be visible from the river.

No impacts would occur to the John Day River Canyon because the Proposed Action would not be seen from the river.

Oregon National Historic Trail

The proposed transmission line would cross the trail alignment in areas where previous agricultural activities have destroyed any evidence of the trail. The proposed facility would not be visible at Fourmile Canyon, Biggs Junction, the Deschutes River

Crossing, McDonald Ferry, or The Dalles Complex. Therefore, there would be no impact to those resources.

Lower Deschutes River Canyon

The Proposed Action would not be visible from the Lower Deschutes River Canyon. Therefore, there would be no impact to that resource.

Lower Klickitat River Canyon

The Proposed Action would not be visible from the Lower Klickitat River Canyon. Therefore, there would be no impact to that resource.

Transportation Facilities

Journey Through Time Scenic Byway

Portions of the Proposed Action would likely be visible from the Byway. However, the proposed facility would be compatible with the Journey Through Time Management Plan's stated goals. The communities of Wasco and Moro have no stated scenic or visual management goals or objectives and the Sherman County Comp Plan Goal XVIII supports the development of wind energy (Sherman County, 2003c).

The Proposed Action would have low impacts on the Journey Through Time Scenic Byway because it would be somewhat visible but not obtrusive in the view and would be seen by few sensitive viewers because facilities are screened, or predominantly viewed in the middleground and background of the view.

The Proposed Action would be visible in the middleground and background from portions of US 97 in Oregon and SR-14 in Washington. The Proposed Action would have low impacts on motorists who used these roads because it would be somewhat visible but not obtrusive in the view and would be seen by few sensitive viewers because facilities are screened, or predominantly viewed in the middleground and background of the view.

The Proposed Action would result in moderate impacts to local roads because the transmission lines, towers, and substation facilities generally would be clearly visible in the view but would not be the dominant feature of the view.

4.8.3.2 Mitigation Measures

Impacts to the general project vicinity would be moderate, but would be compatible with applicable management plans and land use policies. Impacts to important visual resources would be low to none and would also be compatible with applicable management plans and land use policies. Therefore, mitigation would not be required. However, the following measures would be implemented to further reduce potential impacts.

- Use of steel tubes (vs. steel lattice) for towers to the extent possible.
- Use of non-reflective gray paint on tower structures.
- Use of non-specular conductors (i.e., a conductor that has been modified to reduce the amount of reflected light from its surface).

4.8.4 Middle Alternative

4.8.4.1 Impacts

Impacts would be the same for the Middle Alternative as for the Proposed Action.

4.8.4.2 Mitigation Measures

Mitigation measures would be the same as for the Proposed Action.

4.8.5 Klondike III Wind Project

4.8.5.1 Impacts

Residential Areas

The Proposed Action would be visible from many locations in the analysis area at distances ranging from the immediate foreground (less than 100 feet) to the distant background (greater than 20 miles) (see Maps 8 and 9). The proposed facility would be highly visible in the foreground and middleground from local residences.

The facility would result in moderate to high impacts because the turbines and associated facilities (e.g., O&M building, roads, substation) would become the dominant feature or focal point of the view and would be clearly visible. The general project vicinity includes few sensitive viewers, lacks KVAs, and lacks important visual resources with the exception of the John Day River Canyon.

Recreation Areas

Columbia River Gorge National Scenic Area

Portions of the proposed facility would potentially be visible from the CRGNSA. Effects would be viewed at such great distances (about 9 miles or more) that impacts, if any, would be low. Almost without exception, topography or vegetation would screen the proposed facility from view. Opportunities to view the proposed facility are also minimal. In those areas where the proposed facility would be visible, it would be subordinate to the landscape setting that typically includes substantial human development such as interstate and rail transportation corridors, transmission line corridors, and urban and rural development in the foreground and middle ground.

Impacts to the CRGNSA would be low to none because the proposed facility would be somewhat visible, but not obtrusive; would be seen by few sensitive viewers in the background; and would be seen from a distance of more than 3 miles.

John Day River Canyon

The BLM administers the majority of public lands within the John Day Canyon and has indicated that its concern would be visual impacts seen from the John Day River (Mottl, H., 2005a). Therefore, the following assessment keys on impacts to the river and its shoreline and does not consider impacts to the canyon walls that have very limited access.

Portions of the proposed facility would be visible from two river segments: one near McDonald Ferry, the other between approximate river miles 15.9 and 16.8. From the vicinity of McDonald Ferry, the blade tips of three turbines would be visible. The nacelle and blades of a fourth turbine would also be visible. The turbines would not be visible from the nearby BLM interpretive facility for the Historic Oregon Trail or its access road. Viewing opportunities for boaters would be limited to about 1.5 minutes. The blade tips of six turbines would be visible at different times for different durations through the segment between river miles 15.9 and 16.8. Most turbines would be visible for much less of the 1-mile segment. Viewing opportunities for boaters would be limited to about 14 minutes. In many cases, the turbines' silhouettes would be barely discernible, if at all.

The turbines would appear small in scale in the background compared to other human development impacts in the canyon (e.g., irrigated pasture, farm and irrigation equipment, farm houses, trailers, fences, livestock, power lines) that are visible in the foreground and middle ground from the river. Other factors contributing to the minimal contrast of the proposed facility include viewing distance, angle of observation, light conditions, and atmospheric conditions, which have the effect of making the turbines less visible when the sun is in the west or when views are obscured by precipitation, haze, dust, smoke, or fog.

Impacts would be compatible with BLM's VRM Class II management objective: "management activities resulting in changes to the existing character of the landscape may be allowed, provided they do not attract the attention of the casual observer" (BLM, 2000).

Impacts resulting from the proposed facility would be low to moderate because the proposed facility:

- would not become the dominant view but would be in view from parks, recreation facilities, public trails, public lands and waters used for dispersed recreation where the appreciation of natural and scenic resources is a valued part of the use;
- would be somewhat visible but not obtrusive in the view; and
- would be seen by few sensitive viewers because facility would be substantially screened by existing topography.

Oregon National Historic Trail

The proposed facility would not be visible at Fourmile Canyon, Biggs Junction, the Deschutes River Crossing, and The Dalles Complex. Therefore, there would be no impacts to those resources.

Portions of four turbines would be visible from the John Day River and small portions of its banks at McDonald Ferry as described above. Impacts would be the same as described above, that is, while portions of the proposed facility would be visible, turbines would appear small in scale and in the background compared to other human developments.

Lower Deschutes River Canyon

The proposed facility would not be visible from the Lower Deschutes River Canyon. Therefore, there would be no impact to that resource.

Lower Klickitat River Canyon

The proposed facility would not be visible from the Lower Klickitat River Canyon. Therefore, there would be no impact to that resource.

Transportation

Journey Through Time Scenic Byway

Portions of the proposed facility would be visible from and would be compatible with the Journey Through Time Scenic Byway stated goals. Topography and vegetation would substantially block views in the foreground and middle ground, though several turbines would be partially visible in the middle ground.

The proposed facility would have low to moderate impacts on the Journey Through Time Scenic Byway because portions of the project:

- would be visible in the view but not the dominant feature of the view;
- would not become the dominant view but would be in view from locally important roads along which visual quality is not high and which have not been designated for scenic protection;
- would be somewhat visible but not obtrusive in the view; and
- would be seen by few sensitive viewers because facilities are screened, or predominantly viewed in the middle ground and background of the view.

The proposed facility would be visible in the middle ground and background from portions of US 97 in Oregon and SR-14 in Washington. The proposed facility would have low impacts on these roads because it would be somewhat visible but not obtrusive in the view and would be seen by few sensitive viewers because facilities (turbines and towers) would be screened by topography, or predominantly viewed in the middle ground and background of the view.

The proposed facility would be highly visible in the foreground from local roads and would result in moderate to high impacts because the turbines and related facilities (e.g., roads, substations, O&M building) would become the dominant feature or focal point of the view, or would be clearly visible in the view but not the dominant feature of the view. The local project vicinity includes few sensitive viewers, lacks KVAs, and lacks important visual resources, with the exception of the John Day River Canyon.

4.8.5.2 Mitigation Measures

Impacts to residential areas would be moderate to high, but would be compatible with applicable management plans and local land use policies. Therefore, mitigation would not be required.

Impacts to the John Day River Canyon, including McDonald Ferry, would be low to moderate. Since the proposed facility would be compatible with applicable management plans and local land use policies, mitigation would not be required.

Impacts to other recreation areas would be low to none, so mitigation would not be required.

Impacts to the Journey Through Time Scenic Byway (US 97 in Oregon) would be low to moderate. Since the proposed facility would be compatible with applicable management plans and local land use policies, mitigation would not be required.

Impacts to other transportation facilities (e.g., local roads, SR-14, and US 97 in Washington) would be low to high, and would be compatible with applicable management plans and local land use policies. Therefore, mitigation would not be required.

Although mitigation would not be required, the following measures would be implemented to reduce potential impacts:

- Implementation of active dust suppression measures during the construction period to minimize the creation of fugitive dust clouds.
- Use of wind turbine towers, nacelles, and rotors that are locally uniform and that conform to high standards of industrial design to present a trim, uncluttered, aesthetic appearance.
- Use of low-reflectivity, neutral gray, white, off-white, or earth tone finishes for the towers, nacelles, and rotors to minimize contrast with the sky backdrop and to minimize the reflections that can call attention to structures in the landscape.
- Use of neutral gray, white, off-white, or earth tone finishes for the small cabinets containing pad-mounted equipment that might be located at the base of each turbine, to help the cabinets blend into the surrounding ground plane.
- Restriction of exterior lighting on the turbines to the aviation warning lights required by the FAA, which will be kept to the minimum required number and intensity to meet FAA standards.

- Placement of much of the electrical collection system underground, minimizing the system's visual impacts.
- Use of a low-reflectivity finish for the exterior of the O&M facility building to maximize its visual integration into the surrounding landscape.
- Restriction of outdoor night lighting at the O&M facility and the substation to the minimum required for safety and security; sensors and switches will be used to keep lighting turned off when not required, and all lights will be hooded and directed to minimize backscatter and offsite light trespass.
- Use of a low-reflectivity finish for substation equipment.
- Use of low-reflectivity insulators in the substations.
- Use of fencing with a dull finish around the substation to reduce the fence's contrast with the surroundings.

4.8.6 Biglow Canyon Wind Farm

4.8.6.1 Impacts

Residential Areas

Impacts would be the same as those described for the Klondike III Wind Farm (see Maps 8 and 9).

Recreation Areas

Columbia River Gorge National Scenic Area

Impacts would be the same as those described for the Klondike III Wind Farm.

John Day River

The proposed facility would be visible to varying degrees from sections of the BLM lands in the canyon, from the Wild and Scenic River/Oregon Scenic Waterway segment of the river, and the lands extending 0.25 mile on either side of the river. Most of the lands in this area are privately-owned ranch lands that are used for cattle grazing; transmission lines of various voltages can be seen on the hills along the edge of the canyon or crossing the canyon. Public access to these lands is very limited.

In the limited areas along the river corridor from which facility's turbines would potentially be visible, few turbines would be visible from any one point, and only the blades would likely be visible from many locations. In the places where turbines would be visible, they would appear as elements on the ridgelines in the landscape's background and would have minimal direct effect on the appearance of the walls of the canyon or the canyon floor. Although the turbines would potentially be noticeable in some of the views, because of their small numbers, their location in the background, and

the viewing distance (which would range from 1 to 3.5 miles), they would not likely be dominant elements in the scene. To the extent to which they would be visible, the turbines would be subordinate elements of the view, and because views from the canyon already include views of transmission and distribution lines, the presence of the turbines would not substantially alter the existing character and quality of views from the river corridor.

The proposed facility would have moderate to low impacts because the proposed facility:

- would not become the dominant view but would be in view from public lands and waters used for dispersed recreation where the appreciation of natural and scenic resources is a valued part of the use;
- would be somewhat visible but not obtrusive in the view; and
- would be seen by few sensitive viewers because facilities would be partially screened by existing topography.

Oregon National Historic Trail

The proposed facility would not be visible from the High Potential Sites (McDonald Ferry, Fourmile Canyon, Biggs Junction, the Deschutes River Crossing, and The Dalles Complex) within the analysis area. Therefore, there would be no impacts to those resources.

Deschutes River Canyon

The proposed facility would not be visible from the areas in the Deschutes River Canyon along the Deschutes Wild and Scenic River and would be visible only from a small area of the BLM lands within and adjacent to the canyon. Because none of the BLM or private lands that lie within the canyon would be directly affected by the facility and because the facility would not be visible from the interior of the canyon, the facility would be consistent with the BLM Two Rivers Plan and with the provisions of the Wasco County and Sherman County comprehensive plans that identify the Deschutes River Canyon as an important landscape feature.

Impacts to the Deschutes River Canyon would be low to none because the proposed facility would be seen by few sensitive viewers because facilities are partially screened, or predominantly viewed in the middle ground and background of the view; and would not be noticed in the view, or seen from a distance more than 3 miles.

Lower Klickitat River Canyon

The proposed facility would not be visible from the Lower Klickitat River Canyon. Therefore, there would be no impact to that resource.

Transportation

Impacts would be the same (i.e., low to moderate) as those described for the Klondike III Wind Farm.

4.8.6.2 Mitigation Measures

Mitigation would be the same as that described for the Klondike III Wind Farm.

4.8.7 No Action Alternative

No new impacts to visual resources would occur under the No Action Alternative.

4.8.8 Cumulative Impacts

Existing and future development cumulatively increases human-made elements in the rural landscape of the region, adding vertical elements such as farm/agricultural buildings, fences, and signs to the natural terrain. Since the land in the project area is comprised mainly of agricultural uses, these human-made elements are an expected component of the rural landscape.

Cumulative impacts to visual resources potentially increase when industrial and other facilities not related to agriculture are constructed in a rural landscape. The identified cumulative projects would contribute incrementally to potential cumulative impacts on visual resources in the project vicinity. These new facilities would result in moderate to high cumulative impacts to views in the general project area, but this area includes no KVAs or important visual resources (except for the John Day River Canyon) and current viewer sensitivity is low. Cumulative impacts would likely be low to moderate to important visual resources such as the John Day River Canyon and the Journey Through Time Scenic Byway where facilities would potentially be visible in the foreground and middle ground. Cumulative impacts would likely not occur or would be low to the remaining important visual resources in the project vicinity because the cumulative projects would not be visible, or would be visible at such great distances that effects, if any, would be negligible.

Other wind projects in the region, combined with the proposed projects, could create a moderate to high impact to views of various ranges, hillsides and gorges in the region. To many viewers wind farms are a visual attraction, but this perception may diminish as they become commonplace and impact more of the landscape.

4.9 Socioeconomics

4.9.1 Impact Levels

A **positive** impact would occur when an alternative produces one or more of the following effects: provides employment, increases property values, increases tax

revenues, or creates other similar effects on the social and economic vitality of affected communities.

A **negative** impact would occur when an alternative produces one or more of the following effects: reduces employment, reduces a tax base, takes land out of production without compensation, exceeds current capacities for housing and public services, or creates other similar effects on the social and economic vitality of affected communities.

No impact would occur if employment levels, tax revenues, property values, land production, demand for housing and public services, or other similar effects remain unchanged or if impacts would be of short duration.

4.9.2 Action Alternatives

4.9.2.1 Impacts

Socioeconomic Impacts are addressed together because the BPA, Klondike III and Biglow Canyon projects could be constructed at the same time. The BPA Proposed Action and the Middle Alternative would have no discernable differences in their impact to socioeconomics in the area.

Lodging

Local labor would be hired to the extent practicable, but construction of the action alternatives would require construction workers to relocate temporarily to the area. It is likely that the two wind power projects and BPA interconnection would be constructed simultaneously, potentially requiring temporary housing for construction workers on the three projects at the same time. The Klondike III Wind Project and Biglow Canyon Wind Farm ASCs estimate that about 50 to 70 percent of construction staff would be hired from outside the area. Assuming 60 percent of the construction workforce is from outside of the area; lodging would be needed for about 250 temporary employees (30 employees for transmission and substation construction, 70 employees for Klondike III Wind Project and 150 for Biglow Canyon Wind Farm in addition to construction personnel hired locally at peak construction periods). BPA would hire contractors for constructing the transmission line and associated facilities, but would use BPA staff to build spans connecting to the substations. Because work would be temporary, most out-of-town workers would not likely bring their families. Local hiring could be greater, depending on the availability of workers with appropriate skills. Additional workers might commute daily from communities outside the area (e.g., Hood River, and Klickitat County), which would lessen the impacts associated with temporary in-migration of outside workers. Local establishments would benefit from temporarily housing construction workers by increasing demand of available accommodations.

Motels, hotels, and trailer or RV parks would be the most available housing options for temporary residents. Within 30 miles, there are over 750 hotel and motel rooms in The Dalles, Moro, Rufus, Biggs, and Wasco (CH2MHill, 2005). Additional lodging may be available in communities in Washington State or in local campgrounds. Although not

all of these lodging facilities would likely be available at any given time, it is expected that there would an adequate supply to meet the needs of the anticipated number of temporary workers, which could be up to 250 people at one time, and that the proposed project would not have a negative impact.

Local Spending and Employment

Constructing the transmission line, substation, and substation expansion (not including the wind power facilities) is estimated to cost between $40 and $45 million. Construction activities would have short-term positive impacts on the local economy by providing construction-related employment opportunities for local residents. Local businesses would benefit from goods and services sold to construction workers.

Construction workers would likely include a mix of locally hired workers for road and turbine pad construction for the wind projects and excavation for the transmission line towers. Specialized workers would be hired for some portions of construction (e.g., substation and electrical transmission construction, turbine erection, turbine testing, etc.).

While neighboring counties would not gain revenue from the site operation through tax payments, residents from communities within those counties could be employed during the construction and/or operation. Income earned by those individuals would contribute to the local economy indirectly through local purchases. In addition, the proposed facilities would purchase goods and services from local and regional businesses, from facility maintenance services to office equipment to business services. Lease payments to local landowners would also benefit the local economy because it is likely that a portion of the lease payments would be spent in nearby communities. All of this would result in a net inflow of dollars into the local economy and would have a beneficial effect beyond that of the project employment.

An estimated 15 to 20 operational personnel would be employed at each wind facility, increasing local employment within Sherman County by 30 to 40 full-time positions. Additional staff would not be required to maintain the new substation and transmission line, although some maintenance tasks, such as vegetation removal, could be hired locally. An increase in employment opportunities would have a positive effect on the economy in Sherman County, particularly because the area has had difficulty replacing jobs lost when aluminum manufacturers closed in 2001. The wind power facilities would provide long-term employment for the life of the facility, expected to be at least 30 years.

Population

Construction would have short- and long-term positive impacts to the Sherman County population. Short-term population increases would be from construction workers temporarily relocating to the area for a portion or duration of construction. During peak construction periods when potentially all three projects would be under construction, population is estimated to increase by 220 residents. The increase in population related

to construction would be temporary and would have no permanent impact because they would leave when their work is complete. Temporary population increases would have a positive impact to the local economy from the goods and services they would buy.

Permanent increases in population would be minimal, increasing slightly from operations staff moving to the area for the wind power facilities. No additional staff would be needed for the transmission lines and substation facilities. PGE and PPM Energy expect that about 40 percent of the O&M staff would be hired locally. The remaining 60 percent of permanent positions would be filled from outside the area, adding about 72 new residents (24 new employees x 3.00 average persons per household) to the region's population. Assuming 25 percent of new residents moved to Sherman County, Sherman County's population would increase by less than1 percent.

The area could benefit from increased population because it could increase demand for housing units in an area with high vacancy rates. It is likely that full-time, operations in-migrant employees would relocate to communities near the proposed wind power projects where sewer and water services are provided by those local jurisdictions, but some new residents could also relocate to a rural area outside of a town or city where the residences would have private wells and septic systems. Because of the high vacancy rates in Sherman County and its communities, and the small number of expected in-migrants, new residents would likely move to existing housing units that would already be connected to local utilities and would have no impact to those services.

Economic Factors

The proposed project would permanently remove some land from agricultural production, about 225 acres for the transmission line towers, substations and wind power facilities. Landowners would be compensated for impacts to their property. Wind power facility operators would lease land from landowners for each turbine site. Landowners who receive payments for permitting the location of turbines on their property would see an increase in income, having a positive impact to the local economy.

The proposed project would not have an adverse impact on economic activity in the area. Rather, revenues generated from purchases of goods and services in the local area would benefit public services, including schools and others services.

Community Values and Concerns

The public scoping process for the proposed transmission line and substation identified support and concerns for the proposed actions. Generally, comments were in support of the project. Other comments can generally be grouped into five categories: location of the transmission facilities, avoidance of populated areas and homes in rural areas, potential impacts to cultural and archeological resources, impacts to avian species, and visual impacts in the immediate vicinity of the project.

Location of the proposed transmission line was the greatest public concern. Several landowners felt that locating the transmission line along existing roads would have the

least impact on farming operations and that transmission line towers located in the middle of fields could have an adverse impact on farming operations. The Middle Alternative would generally avoid placing towers in the middle of field because it would be located along public rights-of-way or along property lines. The BPA Proposed Action would generally follow public rights-of-way, but would travel across several parcels where it turns west towards the John Day Substation, potentially having a negative impact on the landowners' ability to efficiently use their properties.

Other comments identified concerns about locating the transmission line near homes or in local communities, potential impacts to archeological and cultural resources from ground disturbing activities, and impacts to avian species. Locating the transmission facilities near populated areas, particularly Wasco, were generally in reference to alternatives considered but not advanced for further study, mainly Alternative E, which would have been located near Wasco and a new home. Other concerns about impacts to cultural and archeological resources and impacts to avian species are addressed in Sections 4.10 and 4.6, respectively.

Local and State Taxes

As with other wind power facilities in Sherman County, the proposed energy facilities would be a new source of property tax revenue to local government. Improvements would be included in local property tax valuations. Property tax increases would be paid by the landowner with funds provided by project owners. Additional property tax revenues would provide more funds for schools, roads, police, fire, and other municipal needs, which would benefit the entire community.

Income earned from leases to wind power facilities operators would be taxed as income in Oregon, which would have a positive, albeit minor, impact to state tax revenue.

4.9.2.2 Mitigation Measures

The proposed project would have no negative socioeconomic effects.

4.9.3 BPA No Action Alternative

Under the No Action Alternative, socioeconomic conditions would remain similar to those of today. Temporary and permanent employment related to the action alternatives would not occur. Landowners would not receive lease payments or have any land purchased, and Sherman County would not receive additional tax revenue.

4.9.4 Cumulative Impacts

Development of the identified cumulative projects would generally have a beneficial cumulative socioeconomic effect. In addition to providing additional property tax revenues to local economies, many of these projects would likely increase employment

in the general area, with employees hired both locally and from out of town. To the extent that out-of-town workers are hired, there are sufficient accommodations in the region for the cumulative increase in workers due to the cumulative projects.

The cumulative wind projects would require the acquisition of long-term easements and lease agreements for wind project facilities, which would result in a cumulative loss of agricultural land in Sherman County. However, this economic loss would be mitigated by payments to the landowners. The cumulative effect would benefit the local economy. Additional property tax revenues from the wind power facilities would also benefit Sherman County.

Development of the proposed projects could contribute incrementally to a positive cumulative impact on the economy in the project area from a potential reduction in unemployment, and revenues from increased spending on accommodations, goods, and services during construction. An estimated 15 to 20 operational personnel would be employed at each wind facility in addition to the eight employees at Klondike Wind Project phases I and II, increasing local employment within Sherman County by 38 to 48 full-time positions related to wind power projects.

Other proposed or planned wind projects in Sherman and other counties could also provide employment opportunities.

4.10 Cultural Resources

4.10.1 Impact Levels

- A **high** impact would occur if a resource site is within an access road, substation, tower, turbine, or other proposed facility site. Direct physical disturbance of the site is certain unless adequate avoidance measures are taken.
- A **moderate** impact would occur if a resource site is within 100 feet of the proposed disturbance area or if the site is down slope of potential disturbance. Direct physical disturbance is possible.
- A **low** impact would occur if the resource site is outside the high and moderate impact areas or is in a deep, narrow draw or canyon that may be spanned. Direct physical disturbance is unlikely. Indirect forms of disturbance could occur.
- **No** impact would occur if the proposed facility is design to avoid the resource site and any disturbance to the site.

4.10.2 BPA Proposed Action

4.10.2.1 Impacts

The archaeological survey and records review for the Proposed Action indicate that most of the previous studies and recorded sites are along the Columbia, Deschutes, and

John Day rivers, and are outside of the analysis area. Historic-period documents indicate that the Oregon Trail crossed the proposed route, but field surveys did not identify any evidence of the trail, primarily because much of the project area is cultivated or ROW and has been previously disturbed.

The two archeological sites identified within the project corridor could be affected by construction (AINW, 2005a), although the impact to those sites would depend on the specific location of transmission line towers. Because the archeological sites are small, the towers would be placed to avoid the identified resources, which would cause no impact to cultural resources.

4.10.2.2 Mitigation Measures

For both action alternatives, BPA would avoid disturbing known archaeological and historic resources. Local tribes that historically lived in the area would be consulted to identify any cultural resources to avoid.

During construction, archaeological sites and historic homesteads would be temporarily flagged in the field and on construction maps before and during construction. If necessary, archaeological construction monitors would be present during construction in selected locations to prevent accidental damage to identified cultural resources, as well as cultural resources that may exist in portions of the project area identified by the tribes through consultation.

In the event that undiscovered archaeological sites are inadvertently disturbed during construction, construction work would be halted at the site until an archaeologist or cultural resource specialist could assess the site and determine appropriate mitigation measures.

4.10.3 BPA Middle Alternative

4.10.3.1 Impacts

As with the Proposed Action, the archaeological survey and records review for the Middle Alternative indicate that most of the previous studies and recorded sites are along the Columbia, Deschutes, and John Day rivers, and are outside of the analysis area. Historic-period documents indicate that the Oregon Trail crossed the Middle Alternative route. The portion of the Middle Alternative that would cross the Oregon Trail was not surveyed because access was not granted to the private property where the route would be located. As with the Proposed Action, most of private property in the area is cultivated and the surface is disturbed from farming activities. It is likely that no evidence of the trail remains, although if this alternative were chosen, additional surveys would be required to identify any evidence of intact trail segments.

The two archaeological sites identified within the project corridor could be affected by the construction (AINW, 2005a), although as with the Proposed Action, the impact to those sites would depend on the specific locations of transmission line towers. It is the general policy of the Oregon SHPO that archaeological isolates are not significant

resources and are not eligible for listing in the NRHP. These isolates would not be considered significant resources (AINW, 2005a). Because the archeological sites are small, it is likely that the towers could be placed to avoid the identified resources. Because the entire length of the Middle Alternative was not surveyed, other archeological sites could exist within the Middle Alternative corridor.

4.10.3.2 Mitigation Measures

Mitigation measures would be the same as for the BPA Proposed Action.

4.10.4 Klondike III Wind Project

4.10.4.1 Impacts

Three additional potential historic or prehistoric archaeological resources have been identified within the Klondike III project area since the DEIS was published (Archaeological Investigations Northwest, Inc. 2006).

Additional surveys or testing has been recommended by the consulting archaeologist to determine the significance of these resources. If any of the resources is determined to be significant, they will be avoided, by rerouting any linear feature (e.g., collector lines), or selecting a different location for the future O&M building. Therefore, no impact is anticipated to cultural resources from this project.

Despite the lack of physical evidence for the Oregon Trail within the Klondike III Wind Project site boundary, the trail alignment has been recognized at both federal and state levels. Any intact segments are highly likely to be eligible for listing on the NRHP and would also likely be eligible for designation as a National Historic Landmark. Due to the importance of the trail, construction of the Klondike III Wind Project would avoid the mapped alignment of the Oregon Trail. Should intact physical evidence of the trail that is not currently recognized be observed where there is potential for adverse effects, concerted efforts would be made to avoid any disturbance to the intact segments.

Construction and operation of proposed facility is not likely to result in major adverse impacts to archaeological resources because only scattered isolates occur within the site boundary, nor is it likely to have direct effects on the Oregon Trail because no intact sections have been observed within the site boundary. The project may have adverse impact on the visual setting of the trail, which is described in Section 4.8.

4.10.4.2 Mitigation Measures

If intact trail segments are identified during construction and could not be avoided, the Klondike III Wind Project would consult with the SHPO to determine appropriate mitigation measures.

The turbine strings, particularly those in the northeastern Klondike III Wind Project area, would cross the Oregon Trail alignment. However, there are no known intact trail segments. The trail would not be visible from the five High Potential Sites identified in

the trail's management plan. However, the following mitigation measures are proposed to minimize visual effects to the rural setting of the trail alignment:

- The present setting of the Oregon Trail alignment from the John Day River Canyon to Biggs would be documented through photographs and videotape prior to construction of the Klondike III Wind Project; and

- Klondike III Wind Project would partner with the Sherman County Development League and consult with the Sherman County Historical Society to develop and enhance educational and interpretive displays and materials on the Oregon Trail at Biggs, which offers the best opportunity for visitor contact given the presence of an intact segment of the trail at Biggs and the proximity to I-84.

Archaeological sites and historic homesteads would be temporarily flagged in the field and on construction maps before and during construction. If necessary, archaeological construction monitors would be present during construction in selected locations to prevent accidental damage to identified cultural resources, as well as cultural resources that may exist in portions of the project area identified by the tribes through consultation.

In the event that undiscovered archaeological sites are inadvertently disturbed during construction, construction work would be halted at the site until an archaeologist or cultural resource specialist could assess the site and determine appropriate mitigation measures.

4.10.5 Biglow Canyon Wind Farm

4.10.5.1 Impacts

None of the properties identified within the project boundaries of the Biglow Canyon Wind Farm are believed to be eligible for listing on the NRHP. Homestead A, described in Section 3.10.3, could be directly affected by construction of the proposed facility, but the property is not an eligible resource and impacts would not be significant (CH2MHill, 2005). All other cultural resources would be avoided during construction, operation, and retirement of the proposed facility.

A Cultural Resource Management Plan has been developed for the proposed facility in coordination with the Oregon SHPO. The management plan includes specific protocols and procedures for protecting identified cultural resources, as well as any additional sites discovered during construction.

4.10.5.2 Mitigation Measures

During construction, archaeological sites and historic homesteads would be temporarily flagged in the field and on construction maps before and during construction. If necessary, archaeological construction monitors would be present during construction in selected locations to prevent accidental damage to identified cultural resources, as

well as cultural resources that may exist in portions of the project area identified by the tribes through consultation.

In the event that undiscovered archaeological sites are inadvertently disturbed during construction, construction work would be halted at the site until an archaeologist or cultural resource specialist can assess the site and appropriate mitigation measures be completed.

4.10.6 BPA No Action Alternative

Under the BPA No Action Alternative, no historic or cultural resources would be affected.

4.10.7 Cumulative Impacts

Cultural resources in the project area have been and are being affected because of past and current development activities. Potential adverse effects on cultural resources include disturbance of cultural sites, increased likelihood of vandalism, reduction of the cultural integrity of certain sites, and increased encroachment on cultural sites. Future development could impact cultural resources if developments are not designed to avoid the resources. Cultural resource surveys and coordination with affected Tribes, as required under the National Historic Preservation Act and other environmental laws, would identify the locations of these resources so they could be avoided to the extent possible. While impacts to cultural resources from the identified cumulative projects could result in a net cumulative loss of cultural resource values in the region, implementation of mitigation programs would help reduce cumulative impacts to the extent possible.

Development of the proposed projects would contribute incrementally to these cumulative effects on cultural resources in the analysis area. No known archaeological or historic resources would be directly affected by any of the proposed projects. Visual impacts to historic resources, particularly the Oregon Trail, could occur. Cumulative impacts as they relate to visual resources are described in Section 4.8.8.

4.11 Noise, Public Health and Safety

4.11.1 Noise Levels

4.11.1.1 Construction Noise

Construction of the BPA action alternatives and the wind projects would cause localized, short-duration noise. Such temporarily increased noise levels would result from normal construction activities. Noise levels from construction activities can be expected to range from ambient to 100 dBA at a distance of 50 feet from the activities. OAR 340-035-0035(5)(g) specifically exempts construction activity from regulation. Impacts would be temporary.

4.11.1.2 Transmission Line

Corona-generated audible noise levels were calculated for average conductor heights for fair and foul weather conditions. The predicted levels of audible noise for the proposed transmission line operated at a voltage of 237-kV are given in Table 4-7 and plotted in Figure 3. (See Appendix C for more detail.)

The calculated median level (L_{50}) during foul weather at the edge of the ROW, of the proposed 230-kV transmission line ROW (62.5 feet from centerline) is 42 dBA, the calculated maximum level (L_5) during foul weather at the edge of the ROW is 45 dBA. During fair weather conditions, which occur about 94 percent of the time in the Wasco area, audible noise levels at the edge of the ROW would be about 20 dBA if corona were present. These lower levels could be masked by ambient noise on and off the ROW.

The calculated foul-weather corona noise levels for the proposed transmission line would be comparable to, or less than, those from the existing 230-kV lines in Oregon. During fair weather, noise from conductors might be perceivable on the edge of the ROW; however, beyond the ROW, it would very likely be masked or so low as to not be perceived. During foul weather, when ambient noise is higher, it is also likely that corona-generated noise off the ROW would be masked to some extent as well.

Figure 3 Predicted Foul-weather Audible Noise Levels for the 230-kV Transmission Line.

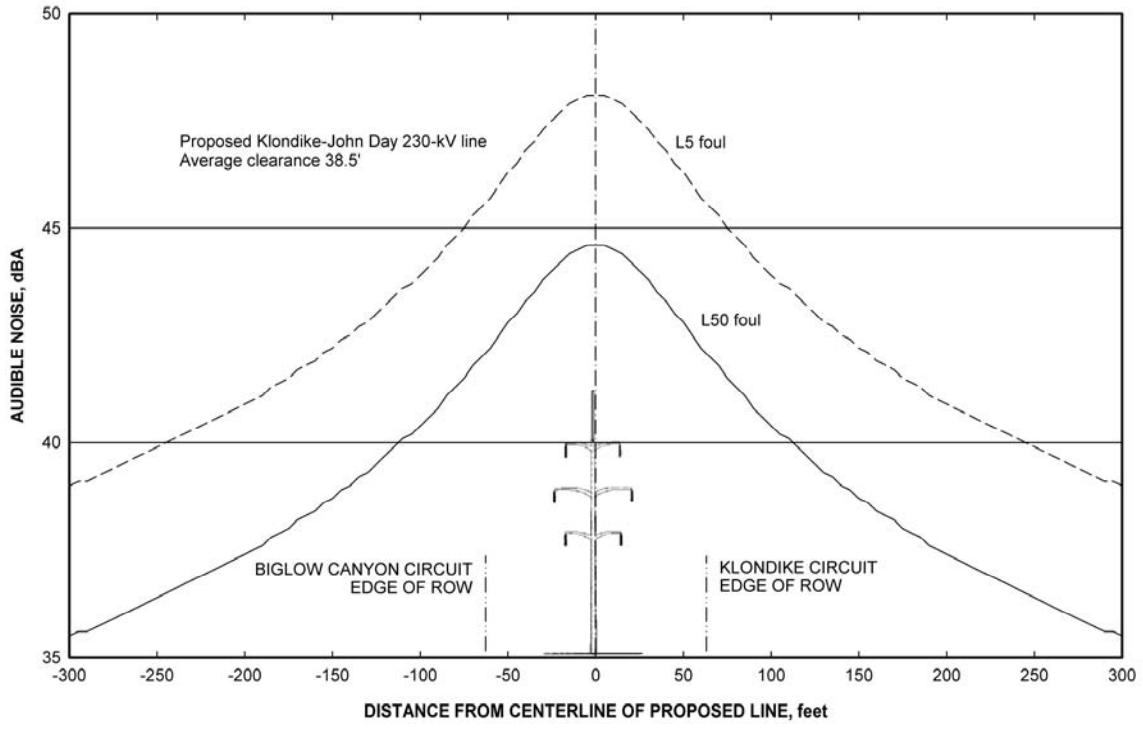


Table 4-7 Predicted Audible Noise Levels at Edge of 230-kV Line ROW

Edge of 230-kV Line Right-of-Way Audible Noise		
Descriptor	**L_{50}, dBA**	**L_5, dBA**
Foul weather	42	45
Fair weather	17	20
Note: AN levels expressed in decibels on the A-weighted scale (dBA). L_{50} and L_5 denote the levels exceeded 50 and 5 percent of the time, respectively.		

On and off the ROW, the levels of audible noise from the proposed transmission line during foul weather would be well below the 55-dBA level that could interfere with speech outdoors. The distance to the nearest residence to the proposed line is about 0.25 miles. At this distance, the AN from the line would be about 30 dBA during foul weather, and probable not be perceived above background noise. During such periods, ambient noise levels could be increased due to wind and rain hitting foliage or buildings.

The computed annual L_{dn} level for transmission lines operating in areas with about 6 percent foul weather is about $L_{dn} = L_{50} – 3$ dBA (Bracken, 1987); therefore, assuming such conditions in the area of the proposed 230-kV line, the estimated L_{dn} at the edge of the ROW would be about 39 dBA, which is well below the EPA L_{dn} guideline of 55 dBA.

Along the proposed transmission line routes there could be increases in the perceived noise above ambient levels during foul weather at the edges of the proposed 230-kV ROW. The corona–generated noise during foul weather would be masked to some extent by naturally occurring sounds such as wind and rain on foliage. During fair weather, the noise levels off the ROW from the proposed transmission line would probably not be detectable above ambient levels. The noise levels from the proposed transmission line would be below levels identified as causing interference with speech or sleep. The audible noise from the transmission line would be below EPA guidelines levels and would meet the BPA design criteria that comply with state noise regulations. Similarly the new substation would be designed and constructed to meet all federal, state and local regulations.

4.11.1.3 Substation

The proposed transformers and other equipment installed at the new John Day 230-kV Substation would be specified so that BPA noise level criterion of 50 dBA for new

substations would be met at the edge of the property (USDOE, 2006). This will ensure that all applicable federal, state and local regulations are met.

However, the new equipment would be placed in an environment with noise from existing transmission lines, and existing equipment in the John Day 500-kV Substation. The combined noise level from the existing and new facilities could exceed 50 dBA design levels at points on the perimeter of the expanded substation; however, the levels would be controlled to meet all applicable regulations at the edge of the property.

4.11.1.4 Wind Projects

The project vicinity is rural and existing noise levels are low with infrequent noise from agricultural activities. DEQ regulations at OAR 340-035-0035 establish noise standards at sensitive receptors. At the proposed project sites, residences are the only noise sensitive properties identified. New noise sources on sites that have not previously been used for commercial or industrial purposes have a limit on the allowable increase over existing ambient noise levels. Generally, sources on new sites may not increase the noise levels by more than 10 dBA.

Both the Klondike III Wind Project and the Biglow Canyon Wind Farm may increase the noise levels by more than 10 dBA. Oregon law allows owners of sensitive receptors to execute a noise easement with the industrial facility to legally exceed this standard, provided some benefit accrues to the property owner. Both wind projects have obtained noise easements from owners of property that might experience noise over the 10 dBA standard.

4.11.2 Electric and Magnetic Field Effects

Electric and magnetic fields from the proposed transmission line have been characterized using well-known techniques accepted within the scientific and engineering community. The expected electric-field levels from the proposed transmission line at minimum design clearance would be comparable to those from existing 230-kV lines in Oregon, and elsewhere. The expected magnetic-field levels from the proposed transmission line would be comparable to those from other 230-kV lines in Oregon and elsewhere. See Appendix D for more information about research regarding effects of EMF.

4.11.2.1 Transmission Line Calculated Values for Electric Fields

The peak electric field expected under the proposed transmission line would be 2.5 kV/m; the maximum value at the edge of the ROW would be about 0.3 kV/m. Clearances at road crossings would be increased to reduce the peak electric field to 0.5 kV/m or less. The electric field from the proposed line would meet regulatory limits for public exposure in Oregon and all other states that have limits and would meet the regulatory limits or guidelines for peak fields established by national and international guidelines setting organizations.

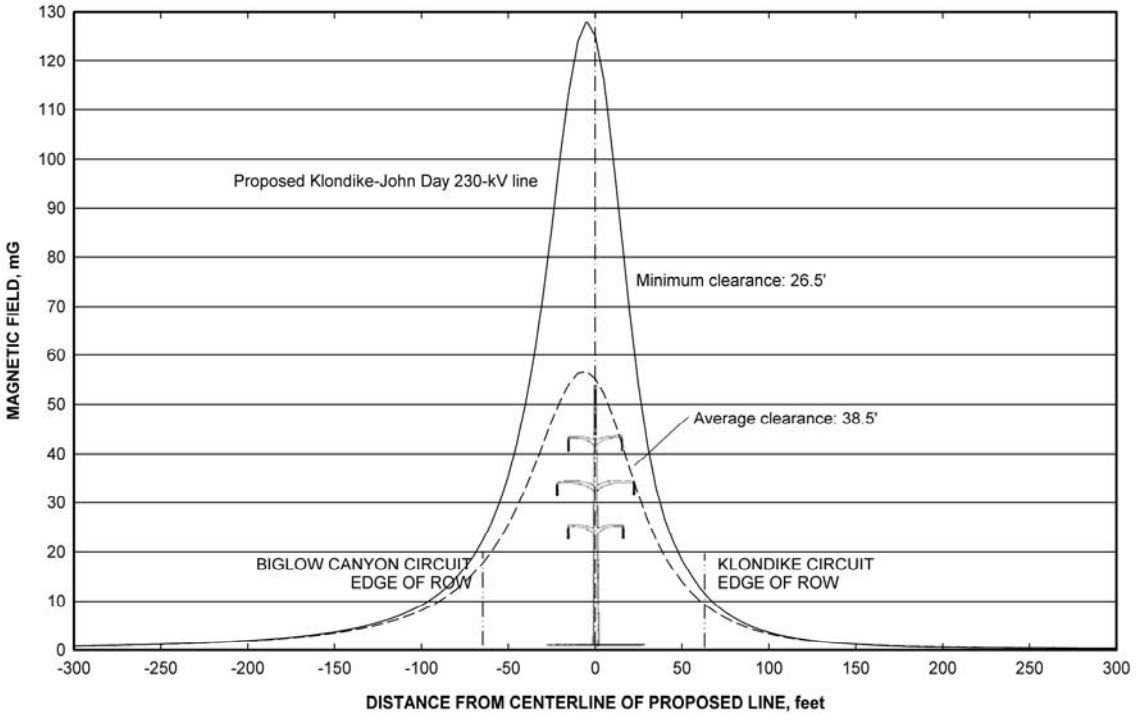
Short-term effects from transmission line fields are well understood and can be mitigated. Nuisance shocks arising from electric-field induced currents and voltages could be perceived on the ROW of the proposed transmission line. To mitigate these effects it is common practice to ground permanent conducting objects during and after construction to guard against such occurrences.

4.11.2.2 Transmission Line Calculated Values for Magnetic Fields

The magnetic fields from the proposed transmission line would be within regulatory limits of the two states that have established them and would be within guidelines for public exposure established by the ICNIRP and IEEE.

Under maximum current conditions on both circuits, the maximum magnetic fields under the proposed transmission line would be 132 mG; at the edge of the ROW of the proposed transmission line the maximum magnetic field would be 25 mG (see Figure 4). With only the Biglow Canyon circuit loaded to maximum current levels, the magnetic fields would increase to a maximum of 150 mG on the ROW and 44 mG along the ROW edge. Over a year, the magnetic field levels would average about 30 percent of the above levels, due to the intermittent nature of the wind resource.

Figure 4 Magnetic-field Profiles for the Proposed Transmission Line Under Maximum Current Conditions.



4.11.2.3 Wind Project Collectors

The wind projects would use 34.5-kV collectors to collect power from the wind turbines. Klondike III's circuits would all be below ground; Biglow Canyon would use above ground and below ground collectors. Above ground circuits emit electric fields and are measurable at the ground; however, buried cables, buried at a depth of 4 feet, emit no electric fields since the electric field is contained within the buried cables.

The voltage, and therefore the electric field, around a conductor, remains practically steady and is not affected by the common daily and seasonal fluctuations in usage of electricity by customers. Electric fields are inversely proportional to the distance a sensor (such as a person) is from the conductors, so that the electric field strength declines as the distance from the conductor increases. The strength of the field (measured in units of kilovolts per meter [kV/m]) at any location depends on the voltage of the conductor, the geometry of the construction, the degree of the cancellation from other conductors, and the distance of the conductors. The maximum electric field under Biglow Canyon's overhead 34.5-kV distribution line would be less than 1 kV/m (CH2MHill, 2005).

Maximum magnetic fields are measured at 1 meter above the ground. Both buried cables and overhead conductors emit magnetic fields. The maximum magnetic field values for the underground circuits occur directly over the buried cable of an isolated circuit, and would be 62.9 mG for the Biglow Canyon project and 41.1 mG for the Klondike III project (DEA, 2005). The maximum magnetic field values for the overhead circuits would be directly under the circuits and would amount to 144.6 mG for Biglow Canyon (CH2MHill, 2005).

4.11.3 Toxic and Hazardous Substances

4.11.3.1 BPA Construction

Several common construction materials (e.g., concrete, paint, and wood preservatives) and petroleum products (e.g., fuels, lubricants, and hydraulic fluids) would be used during construction. BPA would follow strict procedures for disposal of these or any other hazardous materials. A spill response plan would be in place and any spills would be contained and contaminated materials disposed of properly. **No** impacts would occur.

4.11.3.2 Mitigation

BPA would develop and implement a Spill Prevention and Contingency Plan to minimize the potential for spills of hazardous material including provisions for storage of hazardous materials and refueling of construction equipment outside of riparian zones.

4.11.3.3 Wind Projects

Hazardous materials would be used in a manner that is protective of human health and the environment and would comply with all applicable federal, state and local environmental laws and regulations. Accidental releases of hazardous materials (e.g., vehicle fuels during construction/maintenance or lubricating oils for the turbines) would be prevented or minimized through proper containment of these substances during transportation and use. Any oily waste, rags or dirty or hazardous solid waste would be collected in sealable drums and either removed for recycling or properly disposed of by a licensed contractor.

4.11.3.4 Mitigation

In the unlikely event of an accidental hazardous materials release, any spill or release would be cleaned up and the contaminated soil or other materials properly disposed of and treated according to applicable regulations. Spill kits containing items such as absorbent pads would be located on equipment and in on-site temporary storage facilities to respond to accidental spills, if any were to occur. Employees handling hazardous materials would be instructed in the proper handling and storage of these materials as well as where the on-site spill kits would be located.

4.11.4 Fire Protection – All Projects

Construction of the new transmission line, substation and wind projects would take place primarily during spring, summer, and fall. During a portion of this time, the weather could be hot and dry, with increased danger of fire. At such times the potential for fire is high; the potential would increase even more with the increased use of vehicles and other motorized equipment. The addition of construction workers in the area also would elevate the potential for fire. Restrictions on operations during fire season may limit timing of some construction activities. Operation and maintenance, including vegetation management if necessary, would involve increased activity along the line by employees and contractors, slightly increasing the potential for fire. Impacts would be low.

The North Sherman County Rural Fire Protection District has indicated that the proposed projects would not affect the department's ability to provide fire protection or ambulance service for their service areas (Thomas, 2005).

4.11.4.1 Mitigation

To minimize the potential of fires starting from construction-related activities, roads would be established prior to construction to minimize vehicle contact with dry grass; idling vehicles in grassy areas would be avoided; and open flames, such as cutting torches, would be kept away from grassy areas. Staging areas would be graveled to minimize fire potential.

BPA would take all appropriate precautions to prevent fires and follow the fire control regulations, including equipping all vehicles with basic fire-fighting equipment including extinguishers, shovels, and other equipment deemed appropriate for fighting grass fires. BPA will also develop a fire prevention and suppression plan. BPA prohibits the storage of flammable materials on the ROW. Operation and maintenance of the proposed line and substation would follow prescribed policies that minimize the potential for fire.

The proposed turbines for the wind projects have built-in equipment protection features that shut down the turbine automatically to minimize the chance of a mechanical problem causing major damage or a fire. The underground electrical collection system substantially reduces the risk of fire from short circuits caused by wildlife or weather.

The county fire department will be given a copy of the approved site plan indicating the identification number assigned to each turbine, and the location of the substation and accessory structures. The fire department will also receive any gate keys to the facility.

All on-site employees will receive annual fire prevention and response training by qualified instructors or members of the local fire department. Employees will also be required to keep all vehicles on roads and off dry grassland during the dry months of the year, unless such activities are required for emergency purposes, in which case fire precautions will be observed. Service vehicles shall be equipped with a shovel and portable fire extinguisher of a 4A5OBC or equivalent rating.

4.11.5 Radio Interference (RI) and Television Interference (TVI)

The wind projects are not expected to cause radio or TV interference.

The single 1.6-inch diameter conductor that BPA would use for the proposed 230-kV transmission line would mitigate corona generation and keep radio and television interference at acceptable levels below those of many existing 230-kV lines with smaller conductors.

Predicted EMI levels for the proposed 230-kV transmission line are comparable to, or lower than, those that already exist near 230-kV lines and no impacts of corona-generated interference on radio, television or together receptors (such as cell phones) are anticipated. Furthermore, if interference should occur, there are various methods for correcting it, and BPA has a program for responding to legitimate complaints. Impacts would be low.

4.11.6 Sheriff Services

In the event response is required at project facilities, sheriff services can be accommodated with existing department resources. No adverse impacts to the Sheriff's Department are anticipated as a result of the proposed projects (Larhey, 2005).

4.11.7 Health Care

The proposed projects would not adversely impact medical services in the analysis area. Mid-Columbia Valley Medical Center in The Dalles would be capable of providing services for construction and operational employees in case of an emergency (Thomas, 2005).

4.11.8 Additional Health and Safety Mitigation Measures

In addition to the mitigation measures previously identified in Section 4.11, the following additional mitigation measures would help minimize the low potential health and safety risks to workers and the public for construction of the proposed transmission line:

- Prior to the start of construction, the contractor would receive environmental and safety training and prepare and submit for BPA's approval a safety plan. This plan would detail how the contractor would how they would manage hazardous materials such as fuel, oil, solvents etc., and how emergency situations would be handled. The safety plan would be kept on site at all times during construction.
- During construction, the contractor would hold meetings, as needed, to go over potential safety issues and concerns.
- At the end of each workday, the contractor and any subcontractors would secure the site to protect equipment and the general public.
- The contractor and any subcontractors would be trained in tower climbing rescue techniques, first aid including cardiopulmonary resuscitation, and safety equipment inspection.
- BPA would provide notice to the landowners and the public of construction activities.
- If implosive fittings are used to connect the conductors, BPA or the contractor would notify landowners and local government officials in advance.
- During construction activities, the contractor would follow BPA specifications for grounding fences and other objects on and near the proposed ROW.

4.11.9 No Action Alternative

Under the No Action Alterative, the proposed transmission line and wind farms would not be built and the potential health and safety risks associated with them would not occur.

4.11.10 Cumulative Impacts

The proposed projects would have no to low impacts on noise. These impacts would be localized and would not be expected to add cumulatively to noise from other cumulative projects identified in the project vicinity.

Public health and safety for the residents and visitors in the analysis area could be incrementally impacted for a short time during construction, but would not be impacted over the long term. These impacts, added to the impacts from the identified cumulative projects including current and proposed wind farms, would not be expected to strain the existing health and safety infrastructure nor greatly increase risks to local residents and visitors. Additional wind projects and other development would likely have similar low impacts in the general area.

4.12 Air Quality

4.12.1 Impact Levels

Impacts would be considered **high** where actions would:

- Create an effect that could not be mitigated.
- Create a widespread reduction in air quality.
- Create a probable risk to human health or safety.

Impacts would be considered **moderate** where actions would:

- Create an effect that could be partially mitigated.
- Create a localized reduction in air quality.
- Create a possible, but unlikely risk to human health or safety.

Impacts would be considered **low** where actions would:

- Create an effect that could be largely mitigated.
- Create reduced air quality confined to the site of the action or to the time of construction.
- Create insignificant or very unlikely health and safety risks.

No impact would occur if no new source of air pollutants were created.

4.12.2 Impacts from BPA's Action Alternatives and the Wind Projects

Of the six criteria air pollutants, particulate matter, or PM-10, is the main concern for the proposed transmission line, substation and wind farm facilities. PM-10 are particles with aerodynamic diameter smaller than 10 micrometers and include: "dust, dirt, soot, smoke and liquid droplets directly emitted into the air by sources such as factories, power plants, cars, construction activity, fires, and natural windblown dust" (U.S.

Environmental Protection Agency, September, 2003). PM-2.5 are "fine particles" with aerodynamic diameter smaller than 2.5 micrometers. PM-2.5 particles can be "directly emitted from sources such as forest fires or they can form when gases emitted from power plants, industry and automobiles react in the air" (U.S. Environmental Protection Agency, March 1, 2006.) The greatest potential for increased emissions in Sherman County, associated with the proposed projects, is the release of particulate matter into the air during the construction phase. However, construction may not take place simultaneously and the wind projects could be completed in phases, so a small amount of soil would be exposed at any one time.

Fugitive dust emissions would result from dust entrained during project site preparation including road building, on-site travel on unpaved surfaces, and soil disrupting operations. Wind erosion of disturbed areas would also contribute to fugitive dust.

Construction activities also temporarily generate small amounts of carbon monoxide (CO). Heavy trucks and construction equipment powered by gasoline and diesel engines would generate CO from exhaust emissions. If construction traffic were to delay or reduce the speed of other vehicles in the area, CO emissions from traffic would increase slightly. CO emissions would be temporary and limited to the immediate area surrounding the construction site.

Wind farms help off-set the production of air pollutants and greenhouse gasses by replacing a small percentage of energy that otherwise would have to be generated, presumably, by traditional, 'dirtier' energy sources such as a gas or coal fired turbines.

Sherman County is an attainment area with the lowest total emissions of any county in Oregon. The proposed construction time varies and the projects may be completed in phases. Overall, air quality impacts would be low because impacts would occur in the short term in a very localized area, during construction only, with very unlikely health and safety risks.

Permanent operations and maintenance staff would drive to the wind projects daily, likely using gasoline- or diesel-powered vehicles that would generate CO. The exhaust from those vehicles would have almost no impact to air quality in the area considering current air quality and the small number of trips from operations and maintenance staff (15 to 20 employees) needed to operate each facility.

Operations and maintenance staff would perform periodic maintenance on the transmission line and turbines, requiring equipment to drive along gravel or dirt roads along the turbine strings. Depending on the amount of moisture within the soils, some dust could be generated. No long-term impacts are anticipated because the dust generated from those activities would be minimal, particularly when compared to the much higher levels of dust generated from ongoing farming activities in the surrounding area. CO emissions from the small number of maintenance vehicles required would also be minimal and temporary. There would be no long-term impact to air quality.

4.12.3 Mitigation Measures

There are activities that can be taken to mitigate for adverse impacts to air quality due to construction activities. BPA, and PPM and PGE would mitigate for dust during construction and follow all necessary local and federal requirements. During days when the AQI is moderate or worse, dust mitigation measures would also be used.

The following mitigation measures could be used:

- Water trucks would be used on an as-needed basis to minimize dust
- Gravel (2-3 inch) will be placed on access roads before turbine construction
- All construction vehicles will travel at low speeds to minimize dust
- Chipping or "lop and scatter" would be used to dispose of small limbs and branches. No burning will be allowed.
- All on-road vehicles will comply with Oregon State emission standards.
- Off-road vehicles would be in good running condition, minimizing their emissions.
- On-road diesel vehicles will use low sulfur fuel.
- Reseeding and revegetation will minimize exposed soil prone to erosion.

4.12.4 No Action Alternative

Under the No Action Alterative, the proposed transmission line and wind farms would not be built and the potential air quality impacts would not occur.

4.12.5 Cumulative Impacts

The primary air quality impact from the identified cumulative projects would be temporary dust emissions from construction of these projects. Whether these impacts would be cumulatively additive would depend on construction timing, the effectiveness of dust mitigation measures employed, and the distance between the projects.

If some of the cumulative projects have similar construction windows and are located in relative proximity to each other, they could have a temporary low-level impact to air quality in the immediate vicinity of the construction site(s). These impacts would be temporary and localized. With implementation of dust control mitigation measures, construction-related air quality impacts would be reduced. If the projects are completed in phases, these temporary impacts would be created over time, but would not result in long-term cumulative impacts to air quality.

BPA's Proposed Action and the wind projects would add vehicle emissions from construction equipment, as well as cars and other vehicles used by construction, operation, and maintenance staff. These emissions would contribute incrementally to cumulative impacts on air quality from vehicle emissions in the region. However, given the current excellent air quality conditions in the region and the temporary and localized

effects of expected vehicle emissions related to the identified cumulative projects, this cumulative impact would be expected to be low.

4.13 Short-Term Use of the Environment and the Maintenance and Enhancement of Long-Term Productivity

The BPA action alternatives, Klondike III Wind Project, and Biglow Canyon Wind Farm would permanently remove about 17, 62, and 157 acres respectively, (236 acres total), of primarily agricultural land and temporarily disturb about 120, 250, and 393 acres, respectively, (763 acres total) of primarily agricultural land. Following construction, the 763 acres of temporarily disturbed land would be restored (e.g., regraded and replanted) to its pre-project use.

The operators of the Klondike III Wind Project and Biglow Canyon Wind Farm would be required to retire their facilities after the wind projects have ceased operation. Facility retirement would include removal and to the extent practicable, recycling of turbines, turbine pads and other equipment, and returning the land underneath to productive farmland or other habitat. Roads that are improved for the project may be removed or left in place at the request of the property owner. These actions would maintain long-term productivity of farmed lands and wildlife habitat.

4.14 Irreversible and Irretrievable Commitment of Resources

As stated above, most of the impacts to farmland and wildlife habitat would be reversed upon retirement of the projects. However, an unknown acreage of improved farm roads would be left in place at that time and these impacts would not be reversed.

The only irretrievable commitment of resources expected to result from the project is the consumption of fossil fuels during construction, operations, and maintenance of the projects.

4.15 Adverse Effects that Cannot Be Avoided

Implementation of the proposed project would result in some adverse impacts that cannot be fully avoided; many of the impacts would be temporary and others longer term. These impacts and proposed mitigation are discussed under specific resource sections earlier in this chapter. Some of the adverse effects that cannot be avoided in the proposed project include the following:

- Mortality of individual bird and bats.
- Temporary and permanent conversions of land areas to be used for structure sites, access roads, staging areas, tensioning sites, and new substations.
- Interference with farming operations.

- Temporary disturbances to motorists and residents during construction.
- Increased noise levels during construction and operation.
- Potential for health effects from magnetic fields.
- Visual impacts associated with the proposed steel poles, lattice steel towers, substation facilities, and wind turbines.
- Short-term increase in pollutant levels during construction from dust and vehicles.
- Negligible reduction in agricultural production.
- The elimination of small areas of vegetation from permanent physical developments.
- Short-term soil compaction, erosion, and vegetation degradation from construction and maintenance.
- Short-term disturbance to wildlife during construction.
- A reduction in the amount of vegetation available for wildlife habitat.